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gheny from the north were covered by the Kansan advance and filled with its débris. They were afterwards more or less excavated and filled with later modified Wisconsin material; but immediately and at a moderate interval in the past, as is shown by two facts: the state of the crystallines in the Kansan drift, and the condition of the river gorges.

The writer, several years ago (*Am. Jour. Sci.*), made the statement that the majority of glacial students seemed to have failed to consider the state of the surface immediately before the first glacial advance. He, thereupon, stated that all portions of surface outcrops too hard to be ground into flour would form a rusty gravel, with the rustiness due to previous weathering, and not to lapse of time since deposition. This is fully proved in the Kansan drift in western Pennsylvania, where red granite cobbles have been found on top of the hills east of the Allegheny river, and from four to five hundred feet above it, and these have been glaciated on one or two sides, where the smoothed surface acquires the aspect of 'rusty gravel,' while on other sides the old surface weathering remains undisturbed to such an extent that the rock has lost entirely its black bisilicates, is completely kaolinized and is pulverulent. One side is scraped down to the hard and rusty interior, and the other remains as it lay on the surface when picked up by the ice. In the same way local Pocono and Carbonic sandstones will show a hard glaciated surface and a pulverulent angular surface in the same fragment and in hundreds of instances. These lie in red clay on local white sandstone. With these ancient relics are sparingly mixed river-rolled sandstones and shales as highly polished and as hard as any in the Wisconsin deposits. These are found under conditions which exclude their being residual from local weathered conglomerates, and, as in eastern Pennsylvania, they bear witness to the close association of Kansan and Wisconsin formations.

The best proof, however, lies in the state of the river bottoms. My assistant, Mr. Joseph Barrell, has discovered and studied the abandoned channel, not hitherto noted, of Oil Creek below Petroleum Centre, and will discuss it fully later. I wish to call attention to the im-

portance of his discovery that both the old and the present channels are of equal depth; both are filled with Kansan and modified Wisconsin drift, and the creek has not cut down to its preglacial or Kansan level since the glacial epoch.

As the finding of Kansan drift over the region shows that high and low level gravels could accumulate from the same source, so the discovery of this filled valley, under exactly similar conditions which obtain in the Lehigh region, shows that Kansan and Wisconsin advances, as far as the State of Pennsylvania is concerned, were closely allied and not very remote.

EDWARD H. WILLIAMS, JR.
LEHIGH UNIVERSITY, August 3, 1896.

A LARGE LOBSTER.

THE subject of the size attained by the lobster has been recently treated by Herrick in his work on the Habits and Development of the American Lobster.

Various exaggerated reports of lobsters weighing 30 to 40 pounds have appeared as newspaper items, but the authenticity of such statements is questionable.

Herrick describes a specimen captured at Boothbay, Me., in 1891, and now in the museum of Adelbert College, which is probably the largest on record which has received accurate measurements.

On April 10, 1896, there was captured near Block Island a fine specimen which closely approaches in size the one described by Herrick. This was entangled in a trawl line in deep water, and so captured. It passed through the hands of Mr. E. C. Smith, a lobster dealer of Newport, R. I., and is now in the possession of Mr. F. W. Wamsley, of Woods Holl. It is destined for the museum of the Academy of Natural Science at Philadelphia.

The specimen is a male, perfect in every respect, and weighed alive slightly over 22 pounds. I have carefully measured it and find that the total length from tip of rostrum to end of telson is 21 inches. The greatest breadth of carapace is $5\frac{1}{2}$ inches, while the girth just behind the cervical groove, from edge of branchiostegite of one side to same position on other side, is $13\frac{1}{2}$ inches. The crushing chela is on the left side. The

length of its propodus is $13\frac{1}{2}$ inches; the girth just proximal to dactyl is $16\frac{1}{2}$ inches. The propodus of cutting claw is somewhat smaller; length $12\frac{3}{4}$ inches, girth $12\frac{1}{2}$ inches.

The pleon is 11 inches in length, and the girth of tergum of second segment—spine to spine—is $8\frac{1}{2}$ inches.

Apparently this specimen is larger than the one described by Herrick, if we consider only the length. This is due to the perfect rostral spine, which was broken in the Boothbay specimen. If we take the length from base of rostrum to tip of telson—a fair measurement to give an idea of bulk—we find the Block Island specimen is 19 inches, while the one from Boothbay is $19\frac{1}{2}$ inches.

By taking the average of the differences in measurements of the two specimens, I find that the one described by Herrick is larger by about six per cent.

While therefore this specimen is not the largest on record, its perfect condition warrants its description, as it so nearly approaches the maximum in size of the American lobster so far authentically reported. F. C. WAITE.

HARVARD UNIVERSITY, August 1, 1896.

SCIENTIFIC LITERATURE.

Mars. By PERCIVAL LOWELL. Boston: Houghton, Mifflin & Co. 1895. 8°. Pp. 228 + viii; xxiv illustrations.

I am pleased to comply with the Editor's request for a review of Mr. Lowell's interesting book.

The reviewer of a work on organic evolution would find it difficult to avoid mentioning Darwin. Schiaparelli holds a similar place in the literature of Mars. An intelligent criticism of any recent book on Mars must consist largely of a review of Schiaparelli's observations and ideas. Of his predecessors it will be well to mention, for the benefit of non-astronomical readers, the following: (a) Galileo (1610), who discovered the phases of the planet, thereby proving that its light, though very red, is really reflected sunlight; (b) Huyghens (1659), who first observed marking on the surface; (c) Cassini (1666), who determined the length of the Martian day, and discovered the white polar caps; (d) Sir William Herschel (1783), who ob-

served the waxing and waning of the polar caps with the seasons; (e) Beer and Maedler, who published the first map on the planet's surface features, and discovered at least three of the so-called canals; (f) Dawes (1864), whose drawings show a dozen of the canals; and (g) Hall (1877), who discovered the two satellites.

Schiaparelli's work extends continuously from 1877 on. It is impossible to do justice to his labors in this article. He extended our knowledge of the planet enormously in nearly every line—in reference to the polar caps, the so-called seas and continents, but especially in reference to the so-called canals, their appearance and disappearance, their doubling, etc. His entire work bears the impress of a scientific spirit *par excellence*. His observations cover the period 1877–92, but his technical results are comprised in a few papers, and a dozen 8vo. pages suffice for a masterly popular exposition of his general results. His brief papers contain at least the suggestion of all the theories recently exploited by popular writers, though he was not concerned with establishing a theory, but rather with ascertaining facts.

Schiaparelli's remarkable observations of the network of straight canals and their doubling were questioned for years, but the confirmation they finally received at Nice and elsewhere largely removed the doubt.

Mr. Lowell's book on Mars is based upon the Flagstaff, Arizona, observations made by himself between May 31 and November 20, 1894, and by Prof. W. H. Pickering and Mr. A. E. Douglass between May, 1894, and April, 1895. Mr. Lowell delivered a lecture under the auspices of the Boston Scientific Society, on May 22, 1894, in which he is reported (*Boston Commonwealth* for May 24, 1894,) to have announced that his observatory—not yet completed—was for the purpose of making “an investigation into the conditions of life in other worlds, including last, but not least their habitability by beings like or unlike man. This is not the chimerical search some may suppose. On the contrary, there is strong reason to believe that we are on the eve of pretty definite discovery in the matter.”

Speaking of Schiaparelli's canals on Mars, Mr. Lowell is reported to have said in his lec-